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An Intelligent Design Structure of Process of Controlling of Electrical System using Li-Fi Network

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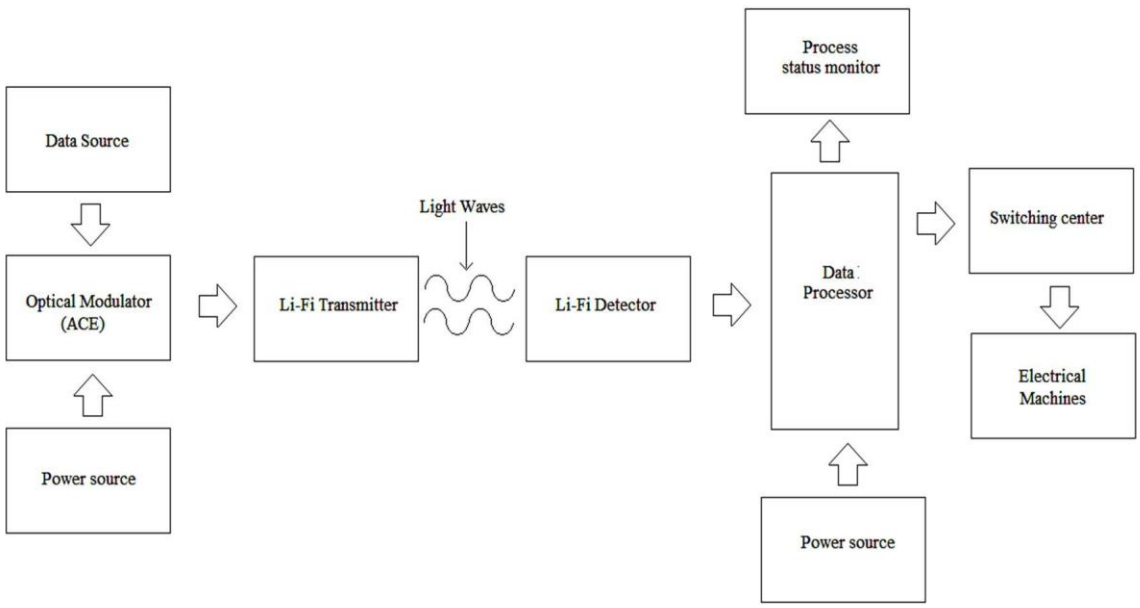
***Abstract*:- This system describes a system that is well suited for use in a small confined area with transmitter broadcasting different control signals in industrial process. The transmitter of the proposed system is constructed using visible light LEDs, in which current fed to the LEDs is modulated and encoded with information or messages. The system provides signal transmission in a free space optical link. The receiver is located at some distance from the transmitters.In industrial manufacturing process, it is extremely important that process should be completed fast and safely besides product quality. Therefore, the communications between units are developing day by day in nowadays- industrial automation systems. We propose to apply a power derating reduction technique at the VLC transmitter based on a modification of the active constellation extension (ACE) method with two important changes: a better predictor of the power derating than the PAPR, the cubic metric (CM), and a more effective clipping stage. With the proposed method, we achieve a significant CM reduction as large as 7.1 dB, which contributes to a noticeable gain in the input power back-off of 2.5 dB or an important reduction of signal distortion, and a greater illumination to communication efficiency (ICE), higher than 30%**

1. INTRODUCTION

Nowadays as a consequence of the important progress in the power semiconductor technologies, real time control of the electrical machines has gained more popularity in the arena of engineering. Due to the increasing complexity and cost of projects, and the growing pressure to reduce the time-to-market, testing and validation of complex systems has become more and more important in the design process. With the great advancement in processor and software technology and their cost decreases, it has become possible to use gradual and complete approach in system design, integration and testing.

2. FUNCTIONAL BLOCKS



Functional block diagram of the system

SYSTEM DESCRIPTION

The system separated into two sections. They are:

i) Li-Fi transmitter

ii) Li-Fi receiver

LI-FI TRANSMITTER

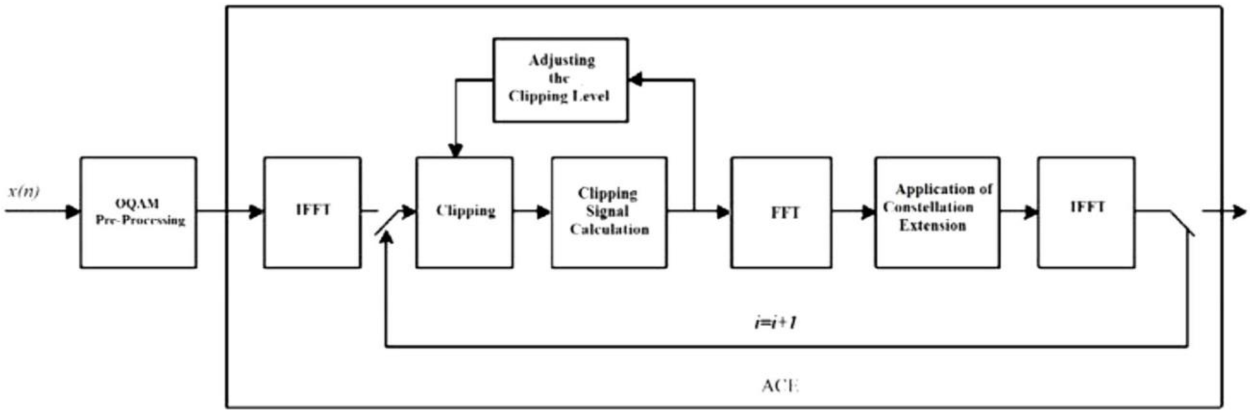
This section consists of data source, optical modulator, power source and Li-Fi transmitter. The data source may be a personal computer or any other portable data terminal unit which should be able to store the commands to operate an electrical device.The optical modulator is used to convert the electrical signals into optical pulses. The conversion process of the modulator is based on active constellation extension method. The output of the optical modulator is applied to the input of the Hi-watt optical sensor i.e., LED. The LED propagates the data light pulses towards different angle. The power source unit is used to supplies the +12V DC regulated power to all transmitter blocks.

Li-Fi Receiver

This section consists of LiFi detector, Data processor, switching center, processor status monitor, power source and electrical machines. The photodiode acts as a Li-Fi detector which is used to converts the light pulses into electrical signals. The converted electrical signals are applied to the input of data processor. The PIC16F877A microcontroller acts as a data processor unit. The controller detects the command from the input. The predesigned program is stored in controller which is used to control the electrical machine process through switching center based on commands. The multiple electrical relay circuit acts as a switching center. The switching center controls the operation of the electrical machines based on input from controller. The process status monitor is used to displays the information about the machine process. The power source is used to supplies the +5V DC regulated power to all receiver blocks.

3. PROPOSED ACE ALOGORITHM

The design idea of the proposed ACE Algorithm combines OSGP and adaptive clipping methods which is as shown in the Fig.3.2. The time domain signal after IFFT is clipped by adaptive clipping level on the transmit side. Then the domain signal which is clipped off is reversed and projected to the frequency domain by FFT. The constellation expansion rule can be used in the frequency domain. If the clipping signal is in the extended direction of the constellation points, it will remain unchanged if not, the clipping signal will be zero. The frequency domain signal after the judgment is projected to the time domain and will generate the peak cancellation signal. The peak cancellation signal is added to the original OFDM/OQAM signal and will offset the large peak signal in the time domain.

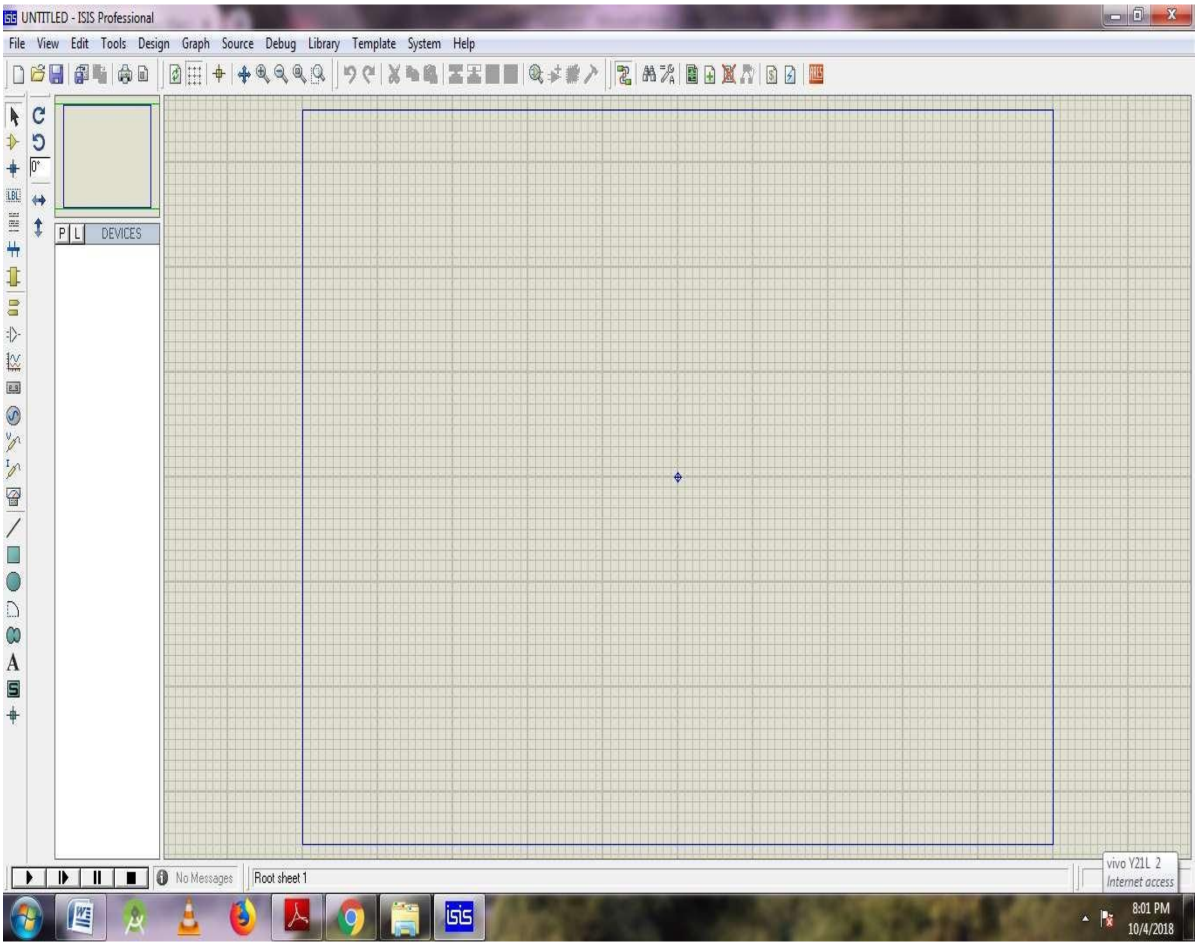


Principle Block Diagram of the Proposed Algorithm

4. SIMULATION SOFTWARE

The **Proteus Design Suite** is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. It was developed in Yorkshire, England by Labcenter Electronics Ltd and is available in English, French, Spanish and Chinese languages. The first version of what is now the Proteus Design Suite was called PC-B and was written by the company chairman, John Jameson, for DOS in 1988. Schematic Capture support followed in 1990, with a port to the Windows environment shortly thereafter. Mixed mode SPICE Simulation was first integrated into Proteus in 1996 and microcontroller simulation then arrived in Proteus in 1998. Shape based autorouting was added in 2002 and 2006 saw another major product update with 3D Board Visualisation.

More recently, a dedicated IDE for simulation was added in 2011 and MCAD import/export was included in 2015. Support for high speed design was added in 2017. Feature led product releases are typically biannual, while maintenance based service packs are released as required.



Proteus simulation window

CONCLUSION

In this system is a simple, low complexity multiple transmitter modulation technique to increase the throughput of an optical wireless communication system has been introduced. This scheme encodes data in the spatial position of the transmitters and is particularly suited for VLC as multiple LEDs are usually the norm for providing sufficient illumination. It has equally be shown within the room and the transmitter- receiver configuration under consideration that using multiple receiver leads to significant improvement in performance with a gain of up to 6 dB observed over the single receiver system for the case of 2 and 3 bits/s/Hz. For a given PD-LED separation, the use of wide angle beam LED can as well be used to provide wider lighting coverage and SER performance enhancement. Using a wider half-angle of 60◦ for the case of two LEDs and assuming an SER of 10^{-6} requires 12 dB and 3 dB less SNR than using LEDs with $\Phi 1/2 = 30^{\circ}$ and 45° respectively. The beam directivity is however of much lower effect when the room under consideration is lit with sufficient LEDs to provide full lighting coverage.

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